

GENERAL ORDER 103

**Public Utilities Commission of the
State of California**

**RULES GOVERNING WATER SERVICE INCLUDING MINIMUM STANDARDS
FOR DESIGN AND CONSTRUCTION**

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I. GENERAL

1. Intent.

- a. Purpose. The purpose of these rules is to promote good public utility practices, to encourage efficiency and economy and to establish minimum standards to be hereafter observed in the design, construction and operation of waterworks facilities by water utilities operating under the jurisdiction of the Commission. The standards herein prescribed are intended as minimum standards applicable after adoption and continued full utilization of existing facilities is contemplated. Nothing contained in any of the rules herein promulgated shall be construed to require the replacement or abandonment prior to the expiration of economic utilization of facilities in use at the time of adoption of these rules unless the Commission, after hearing, shall enter an order directing the abandonment or replacement of particular facilities found to be inadequate for the rendition of proper public utility service.
- b. Absence of Civil Liability. These rules are adopted by the Commission to establish minimum standards in relation to the design, construction and operation of waterworks facilities by water utilities operating under the jurisdiction of the Commission. Such establishment shall not impose upon these utilities, and they shall not be subject to, any civil liability for damages, which liability would not exist at law if these rules had not been adopted.

2. Applicability. These rules are designed primarily for utility systems supplying potable water under pressure but shall apply insofar as they may be appropriate to utility systems supplying water not intended or claimed to be potable from ditches, canals or other conduits. The paragraphs of these rules applicable to utility systems supplying such non-potable water are set forth in Appendix A hereto.

3. Definitions

- a. Commission. In the interpretation of these rules the word "Commission" shall be construed to mean the Public Utilities Commission of the State of California.
- b. Utility. Any person, firm, or corporation, their lessees, trustees, receivers or trustees appointed by any court whatsoever, owning, controlling, operating, or managing any water system within this State, who sells, leases, rents, or delivers water to any person, firm, corporation, municipality, or any other political subdivision of the State, whether under contract or otherwise, is a public utility, except as provided in Sections 2704, 2705 and 2706 of the Public Utilities Code.

- c. Customer. The word “customer” shall be construed to mean any person, firm, association, corporation or governmental agency supplied or entitled to be supplied with water service for compensation by a utility.
 - d. Meter. The word “meter” shall be construed to mean any device used for the purpose of measuring the quantity of water delivered by a utility to a customer.
 - e. Service Pipe. The term “service pipe” shall be construed to mean the connection between the utility’s mains and the service connection and shall include all of the pipe, fittings and valves necessary to make the connection.
 - f. Service Connection. The term “service connection” shall be construed to mean the point of connection to the customer’s piping or ditch with the meter, service pipe or ditch owned by the utility.
4. Information Available to Public. The utility shall maintain, open for public inspection, at its more important commercial offices pertinent information regarding the service rendered including the following:
- a. Characteristics of Water. A description in writing of the kind of water to be furnished, whether filtered or unfiltered and whether treated or untreated and the extent thereof.
 - b. Rates and Rules. A copy of the tariff schedules consisting of rates, general rules of the utility, service area maps and forms of contracts and applications applicable to the territory served from that office.
 - c. Reading Meters. Information about method of reading meters.
 - d. Bill Analysis. A statement of the past readings of the meter or meters serving a customer’s own premises for a period of two years.
5. Access to Property. The utility shall at all reasonable hours have access to meters, service connections and other property owned by it which may be located on customer’s premises for purposes of installation, maintenance, operation or removal of its property at the time service is to be terminated. The customer’s system should be open for inspection at all reasonable times to authorized representatives of the utility. Any employee of the utility whose duties require him to enter the customer’s premises shall wear a distinguishing uniform or other insignia, identifying him as an employee of the utility, or carry on his person a badge or other identification which will identify him as an employee of the utility, the same to be shown by him upon request.
6. Discontinuance of Service.
- a. For Noncompliance with Rules. No utility shall discontinue service to any customer for violation of its rules without first

having diligently tried to induce the customer to comply with its rules on file with the Commission. After such effort on the part of the utility, service may be discontinued after the utility has given the customer at least five day's written notice of such intention either by mail or by leaving such notice in a conspicuous place at the customer's premises. Where safety of water supply is endangered, service may be discontinued immediately without notice.

b. For Nonpayment of Bills

- (1) General Conditions. No utility shall discontinue service to any customer for nonpayment of bills (including delayed payment charges) without first having diligently tried to induce the customer to pay same. After such effort on the part of the utility, service may be discontinued after the utility has given the residential customer at least 10 days and the nonresidential customer at least 7 days written notice of such intention in the manner provided in the preceding paragraph, commencing after the 19-day normal payment period, except that no service may be discontinued on any Saturday, Sunday, legal holiday, or at any time in which the business offices of the company are not open to the public. Provided further that the utility shall make a reasonable attempt to personally contact an adult on the residential customer's premises, either by telephone or by visit at least 24 hours prior to termination. For elderly or handicapped residential customers, the utility shall provide at least 48 hours notice by telephone or visit. For these customers, if a personal contact cannot be made, a notice shall be posted in a conspicuous location at the service address at least 48 hours prior to termination.
- (2) Special Conditions Pertaining to Individually and Master Metered, Multi-Unit Residential Service. For master metered and individually metered service to multi-unit residential structures, mobile home parks, or residential structures in a permanent labor camp, where the owner, manager or operator is listed by the utility as the customer of record, the notification as prescribed in subdivision (1) above shall apply to each residential occupant to whom service is provided in addition to the customer of record. In the event that service is to be terminated for the current customer of record, the utility shall make service available to the individual residential occupants if there is a physical means and it is legally available to do so. Where said users are master metered by the utility, the written notice will be at least 15 days prior to discontinuance of service. Provided further that a representative may act on the behalf of a master metered user, and the utility will not discontinue service in any of the following situations:

- (a) During the pendency of an investigation by the utility of a master metered customer dispute or complaint.
- (b) When the master metered customer has been granted an extension of the period for repayment of a bill.
- (c) For an indebtedness owed by the master metered customer to any other person or corporation or when the obligation represented by the delinquent account or other indebtedness was incurred with a person or corporation other than the utility demanding payment therefor.
- (d) When a delinquent account relates to another property owned, managed, or operated by the master metered customer.
- (e) When a public health or building officer certifies that termination would result in a significant threat to the health or safety of the residential occupants or the public.

In the event of a wrongful termination of master metered service by the utility, the utility shall restore, without charge, the water service to the customer and shall, in addition, be liable to the customer for actual damages resulting from the termination and for the costs of enforcement of this section, including, but not limited to, reasonable attorney's fees, if the customer or the representative thereof made a good faith effort to have the service continued without interruption.

- c. For Unsafe Apparatus or Where Service is Detrimental or Damaging to the Utility or Its Customers. If an unsafe or hazardous condition is found to exist on the customer's premises, or if the use of water thereon by apparatus, appliances, equipment or otherwise is found to be detrimental or damaging to the utility or its customers, the service may be shut off without notice, provided that the utility shall notify the customer immediately of the reasons for the discontinuance and the corrective action to be taken by the customer before service can be restored.
- d. For Fraudulent Use of Service. When the utility has discovered that a customer has obtained water service by fraudulent means, or has diverted the water service for unauthorized use, the service to that customer may be discontinued without notice. The utility shall not be required to restore service until the customer has complied with all filed rules and reasonable requirements of the utility and the utility has been reimbursed for the full amount of the service rendered and the actual cost to the utility incurred by reason of the fraudulent use.
- e. Reconnection. In all cases of discontinuance of service as herein defined, and after the cause for discontinuance has been corrected, and all rules of the utility on file with the Commis-

sion have been complied with, the utility shall, without unreasonable delay, restore service to the customer.

- f. Charge for Reconnection. Where service has been discontinued for violation of rules or for nonpayment of bills, the utility may charge \$10.00 for reconnection of service during regular working hours or \$15.00 for reconnection of service at other than regular working hours when the customer has requested that the reconnection be made at other than regular working hours.

7. Refusal to Serve.

- a. Conditions for Refusal. The utility may refuse to serve an applicant for service under the following conditions:

- (1) If the applicant fails to comply with the rules of the utility as filed with the Commission.
- (2) If the intended use of the service is of such a nature that it will be detrimental or injurious to the service furnished to existing customers.
- (3) If, in the judgment of the utility, the applicant's installation for utilizing the service is unsafe or hazardous, or of such a nature that satisfactory service cannot be rendered.
- (4) Where service has been discontinued for fraudulent use, it shall be the duty of the utility before making service connections to a new customer to ascertain that prior fraudulent use of the facilities will not be attributed to the new customer. Where service has been discontinued for fraudulent use, the utility shall not be required to serve an applicant until the utility has determined that all conditions of fraudulent use or practice have been corrected.

- b. Notification to Customers. When an applicant is refused service under the provisions of this rule, the utility shall notify him promptly of the reason for the refusal to serve and of his right to appeal the utility's decision to the Commission.

- 8. Complaints. Upon complaint to the utility by a customer either at its office, by letter or by telephone, the utility shall promptly make a suitable investigation and advise the complainant of the results thereof. It shall keep a record of all complaints which shall show the name and address of the complainant, the date and nature of the complaint, and the adjustment or disposition thereof for a period of two years subsequent to the final settlement of the complaint. After two years the utility shall keep at its option either the original complaints or a summary of such complaints for an additional three years. Complaints with reference to rates or charges which require no further action by the utility need not be recorded.

- 9. Accidents. The utility shall cooperate with the Commission to promote a reduction in hazards within the industry and to the public. The utility shall keep a record of any accident endangering

the public in general, or its employees, or disrupting the facilities for supplying water to the public which may have caused substantial property damage, serious personal injury or death, which shall be available for inspection by the Commission for the period prescribed by the California Code of Civil Procedure for the commencement of actions thereon but in no instance less than five years. The utility shall assist the Commission in the event of an investigation by the Commission staff.

10. Records and Reports.

- a. System Maps. Each utility shall have on file at its principal office located within the state, drawings, maps or other permanent records for the purpose of aiding in the operation of the water system. The scale of such maps or drawings shall be such that all data recorded thereon shall be clear and legible. These records, unless the Commission otherwise authorizes, shall show the following:
 - (1) Location of all principal pumping stations, diversion works, water treatment and filter plants, sources of supply, storage facilities, size, character, and location of all mains and ditches, including valves and gates, gauges, interconnections with other systems and fire hydrants.
 - (2) Location, size and kind of each service pipe.
 - (3) Layout of all principal pumping stations, water treatment and filter plants to show size, location and character of all major equipment, pipelines, connections, valves and other equipment used in connection therewith.
 - (4) The date of construction of all principal items of plant and extensions of main.
- b. Location of Records. All records required by these rules shall be kept at the principal office of the utility or other suitable storage place located within the state and shall be made available to representatives, agents or employees of the Commission upon reasonable notice and at all reasonable hours.
- c. Reports to the Commission. The utility shall furnish to the Commission, at such times and in such form as the Commission may require, the results or summaries of any tests required by these rules. The utility shall also furnish the Commission with any information concerning the utility's facilities or operations which the Commission may request and need for determining rates or judging the practices of the utility.

11. Deviations from Any of These Rules. In those cases where the application of any of the rules incorporated herein results in undue hardship or expense to the utility, it may request specific relief by filing a formal application in accordance with the Commission's Rules of Procedure, except that where the relief to

be requested is of minor importance or temporary in nature, the Commission may accept an application and showing of necessity by letter.

II. STANDARDS OF SERVICE

1. Quality of Water.

- a. General. Any utility serving water for human consumption or for domestic uses shall provide water that is wholesome, potable, in no way harmful or dangerous to health and, insofar as practicable, free from objectionable odors, taste, color and turbidity. Any utility supplying water for human consumption shall hold or make application for a permit as provided by the Health and Safety Code of the State of California, and shall comply with the laws and regulations of the state or local Department of Health Services. It is not intended that any rule contained in this paragraph II 1 shall supersede or conflict with an applicable regulation of the State Department of Health Services. A compliance by a utility with the regulations of the State Department of Health Services on a particular subject matter shall constitute a compliance with such of these rules as relate to the same subject matter except as otherwise ordered by the Commission.
- b. Water Supply. In the absence of comparable requirements of the State Department of Health Services, the following general rules shall apply:
 - (1) Source. Water supplied by any utility shall be:
 - (a) Obtained from a source free from pollution; or obtained from a source adequately purified by natural agencies; or adequately protected by artificial treatment.
 - (b) From a source reasonably adequate to provide a continuous supply of water.
 - (c) Of such quality as to meet the United States Environmental Protection Agency Drinking Water Standards.
 - (2) Operation of Supply System.
 - (a) The water supply system, including wells, reservoirs, pumping equipment, treatment and filtration works, mains, meters and service pipes shall be free from sanitary defects.
 - (b) No physical connection between the distribution system of a public potable water supply and that of any other water supply shall be permitted except in compliance with the Regulations Relating to Cross-Connections of the State Department of Health Services contained in Title 17 of the California Administrative Code.
 - (c) The presence of algae, crenothrix and other growths in the water shall be controlled by proper treatment.

c. Testing of Water.

- (1) Test. Each utility shall have representative samples of the water supplied by it examined by the state or local Department of Health Services or by an approved water laboratory as defined in Title 17 of the California Administrative Code, at intervals specified by the state or local Department of Health Services, in accordance with the United States Environmental Protection Agency Drinking Water Standards.
- (2) Reports of Tests. The Commission shall be promptly notified in writing by the utility and supplied with a preliminary report describing the situation when matters of water quality are under review by the state or local Health Department as a result of not meeting the United States Environmental Protection Agency Drinking Water Standards. A final report shall be submitted to the Commission within a reasonable time after final disposition of the matter.

2. Continuity of Service.

- a. Emergency Interruptions. Each utility shall make all reasonable efforts to prevent interruptions to service and when such interruptions occur shall endeavor to reestablish service with the shortest possible delay consistent with the safety to its customers and the general public. Where an emergency interruption of service affects the service to any public fire protection device, the utility shall promptly endeavor to notify the Fire Chief or other public official responsible for fire protection of such interruption and of subsequent restoration of normal service.
- b. Scheduled Interruptions. Whenever any utility finds it necessary to schedule an interruption to its service, it shall, where feasible, notify all customers to be affected by the interruption, stating the approximate time and anticipated duration of the interruption. Scheduled interruptions shall be made at such hours as will provide least inconvenience to the customers consistent with reasonable operations. Where public fire protection is provided by the mains affected by the interruptions, the utility shall promptly endeavor to notify the Fire Chief or other officials responsible for fire protection, stating the approximate time and anticipated duration. In addition, the Fire Chief or other official responsible for fire protection shall be notified promptly upon restoration of service.
- c. Record of Interruptions. Each utility shall keep a complete record of all major interruptions, both emergency and scheduled. This record shall show the cause for interruption, date, time, duration, location, approximate number of customers

affected and, in cases of emergency interruptions, the remedy and steps taken to prevent recurrence.

- d. Reports to Commission. All emergency interruptions involving an entire system, an entire separately operated system of a multi-system utility or a major portion of an entire or separately operated system shall be reported to the Commission by the utility as soon as possible after occurrence by telephone or telegraph stating the cause, date, time, estimated duration, location, approximate number of customers affected and remedial steps being taken to restore service. Written reports thereof shall be submitted to the Commission within 48 hours after restoration of service giving the information outlined in subparagraph c above, together with such other data as may be appropriate under the circumstances.

3. Pressures.

- a. Variations in Pressure. The utility shall maintain normal operating pressures of not less than 40 p.s.i.g. nor more than 125 p.s.i.g. at the service connection, except that during periods of hourly maximum demand the pressure at the time of peak seasonal loads may be not less than 30 p.s.i.g. and that during periods of hourly minimum demand the pressure may be not more than 150 p.s.i.g. Subject to the minimum pressure requirement of 40 p.s.i.g., variations in pressures under normal operation shall not exceed 50% of the average operating pressure. The average operating pressure shall be determined by computing the arithmetical average of at least 24 consecutive hourly pressure readings.
- b. Main Sizing. As new mains are installed or as mains which have reached the end of their useful lives are replaced, the new or replacement main shall be sized and designed to accommodate the standards of paragraph II 3 a.
- c. Delineation of Minimum Normal Operating Pressures. Other minimum normal operating pressures are applicable within delineated areas as set forth on the utility's Commission approved tariff sheets.
- d. Pressure Gauges. Each utility shall provide itself with one or more recording pressure gauges for each separately operated system for the purpose of making pressure surveys as required by these rules. These gauges shall be able to record the pressure experienced on such system and shall be able to record a continuous 24-hour test. Each utility serving 1,000 or more customers in a separately operated system or 1,000 or more customers in any separately operated system of a multi-system utility shall maintain one or more of these recording pressure gauges in service at some representative point or points on the utility's system.

- e. Pressure Surveys. At regular intervals, but not less than once each year, each utility shall make a survey of pressures in its distribution system of sufficient magnitude to indicate the pressures maintained at representative points on its system. Such surveys should be made at or near the period of maximum usage. The pressure charts for these surveys shall show the date and time of beginning and end of the test and the location at which the test was made. Records of these pressure surveys shall be maintained by the utility for a period of at least three years and shall be made available to representatives, agents or employees of the Commission upon request.
- 4. Water Supply Measurement.
 - a. Measuring Devices. Each utility shall install a suitable measuring device, or otherwise determine production, at each source of supply in order that a record may be maintained of the quantity of water produced by each source.
 - b. Records. At least once each month, the quantity produced from each source of supply shall be determined. Twelve-month totals by sources shall be recorded and transmitted to the Commission in the utility's annual report to the Commission.

III. STANDARDS OF DESIGN

- 1. General. The system shall be adequate to deliver the water requirements of all customers and meet the requirements of paragraph II 3 a.
- 2. Distribution System.
 - a. Minimum Pipe Sizes. The distribution system shall be of adequate size, and so designed in conjunction with related facilities to maintain the minimum pressures required by paragraph II 3 a and the minimum pipe size required by paragraph VIII 3. In no event, however, should the minimum pipe size for new mains be less than six inches in diameter.
- 3. Transmission Systems. The transmission pipelines from sources of supply shall be designed to deliver in combination with related storage facilities and to the limits of the capacity of those sources of supply the maximum requirements of that portion of the system which is dependent upon such transmission pipelines.
- 4. Water Supply Requirements. The quantity of water delivered to the distribution system from all source facilities should be sufficient to supply adequately, dependably and safely the total requirements of all customers under maximum consumption, and should be determined so as to maintain the specified pressures as required by paragraph II 3 a. Combined flow from sources of supply and storage capacity should be adequate for four consecutive days of maximum use. The utility may make use of the Water Supply Requirements Chart (Chart 1), appended hereto and made a part of these Minimum Standards for average

requirements of service. For other than such average requirements, the results obtained from Chart 1 shall be supplemented as appropriate.

5. Materials and Specifications.

a. Qualification. Metallic and nonmetallic materials may be used separately and in combination to construct component parts of a water system including, but not limited to, conduits, pipes, couplings, caulking materials, protective linings and coatings, services, valves, hydrants, pumps, tanks and reservoirs; provided:

- (1) The material shall have a reasonable useful service life.
- (2) The material shall be capable of withstanding with ample safety factors the internal and external forces to which it may be subjected in service.
- (3) The material shall not cause the water to become impure, unwholesome, unpotable or unhealthful.
- (4) Materials and equipment shall be so selected as to mitigate corrosion, electrolysis and deterioration.

b. Specification. Materials and equipment shall be specified by a properly qualified person.

c. Newly Developed Materials and Equipment. It is not the intention to prevent the use of newly developed materials and equipment that otherwise meet the requirements of paragraphs a and b, above.

d. Minimum Requirements for Steel Pipeline. The requirements as set forth in paragraphs a, b and c, above, are intended to be general in nature in order to permit full discretion in the selection of proper materials and equipment by the qualified person. However, in distribution and transmission systems the following minimum requirements shall be met in the design of steel pipelines.

(1) Outside Coating. Any of the following, except that those portions laid above ground may be protected on the outside after cleaning by painting only:

- (a) Coat tar enamel wrapped as specified by American Water Works Association Specification No. C203.
- (b) Asphalt with asbestos felt or fiberglass wrapping in accordance with the Specifications shown in Appendix B.
- (c) Reinforced concrete in accordance with American Water Works Association Specification No. C205.

(2) Inside Lining. Any of the following:

- (a) Coat tar enamel in accordance with American Water Works Association Specification No. C203.
- (b) Asphalt as specified in the Specifications shown in Appendix B.
- (c) Cement lining in accordance with American Water

Works Association Specification No. C205 or Federal Specification WWP 406, where applicable.

- (3) Pipes Under 4-inches Outside Diameter. Pipes under 4-inches in outside diameter may be dipped in asphalt after cleaning without wrapping, provided they have a minimum wall thickness of 12-gauge. If wrapped outside in accordance with the specifications outlined in paragraph d(1), above, the minimum gauge shall be 14-gauge.
- (4) Pipes 4-inches Outside Diameter and Larger. The wall thickness of pipes 4-inches in outside diameter and larger shall meet the following minimum gauge requirements:
 - (a) 4-inch O.D. to and including 6 $\frac{5}{8}$ -inch O.D. pipe—12-gauge.
 - (b) 7-inch O.D. to and including 10 $\frac{3}{4}$ -inch O.D. pipe—10-gauge.
 - (c) Pipes over 10 $\frac{3}{4}$ -inches in outside diameter shall be of 10-gauge minimum steel thickness.

All such pipes shall meet the standard specifications of the American Water Works Association Specification No. C202 and be of adequate design for the existing conditions.

- (5) Exception when Used for Reinforcing. Where steel pipe is used as reinforcing for cement coated and lined pipe, steel of lesser wall thickness may be used provided the design is such that the strength of the reinforced concrete is equal to the American Water Works Association Specification No. C202 or Federal Specifications SS-P-381 for a steel pipe of the same diameter.
- (6) Exception for Non-corrosive Soils. Where maximum operating pressures will not exceed 200 p.s.i.g. and where soil resistivities are not less than 2,500 ohms/cm³ by tests along the proposed route at intervals not exceeding 250 feet as determined by a properly qualified person or a satisfactory history of service life or prior test along the proposed route which can be certified to be correct and shown to be reliable information by the owner or an officer of the utility, steel of the following lesser wall thicknesses may be used for pipes coated in accordance with paragraph d (1) (a) or (b), above, and lined in accordance with paragraph d (2) (a) or (c), above, as follows:
 - (a) Coat tar lined pipes:
 - 1. 4-inch O.D. to and including 6 $\frac{5}{8}$ -inch O.D.—14-gauge.
 - 2. 7-inch O.D. to and including 10 $\frac{3}{4}$ -inch O.D.—12-gauge.
 - (b) Cement-mortar lined pipes, minimum lining $\frac{1}{4}$ -inch;
 - 1. 4-inch O.D. to and including 8 $\frac{5}{8}$ -inch O.D.—14-

- gauge.
2. 9-inch O.D. to and including 12 $\frac{3}{4}$ -inch O.D.—12-gauge.

IV. STANDARDS OF CONSTRUCTION

1. General. The design and construction of the utility's water plant shall conform to standard acceptable engineering practices. It shall be designed and operated so as to provide reasonably adequate and safe service to its customers and shall conform to the requirements of the state or local Department of Health Services with reference to sanitation and potability of water.
2. Disinfection of Facilities. All new mains, pumps, tanks, wells and other facilities for handling potable water and insofar as practicable, repaired mains and other facilities, shall be thoroughly disinfected before being connected to the system. The method of disinfection shall be as approved by the State Department of Health Services.
3. Mains.
 - a. Depth of Mains. Water mains should be installed below the frost line or be otherwise protected to prevent freezing and shall not have less than 30-inches of cover over the top of the pipe in public streets or alleys except where it is necessary to avoid underground obstructions or rocky or hardpan conditions where such depth is not feasible.
 - b. Dead Ends. Insofar as practicable, the utility shall design its distribution system so as to avoid dead ends in its mains. Where dead ends are necessary, the utility shall provide a means for flushing the mains where the normal consumption does not provide adequate circulation of the water. Mains with dead ends shall be flushed as often as necessary to maintain the proper quality of the water.
 - c. Segmentation of Systems. Valves shall be provided in distribution mains at reasonable intervals so that repairs may be effected by the utility with interruptions to the service of a minimum number of customers. When feasible, valves shall be provided in the mains at intervals not to exceed one continuous block or 500 feet, whichever is greater, except where a dead end run is not intended to serve any intervening customers.
 - d. Grid Systems. Wherever feasible, the distribution system shall be laid out in a properly segmented grid so that in case of breaks or repairs the interruption to service to the customers can be kept to a minimum in number.
4. Service Connections.
 - a. Size of Service Pipe. The size, design, material and installation of the service pipe shall conform to the reasonable requirements of the utility, provided, however, that the mini-

mum size of the pipe shall not be less than ¾-inch nominal size. The utility may require the customer to provide such data as may be necessary for the utility to properly size a service larger than ¾-inch nominal size consistent with the requirements of paragraph II 3 a. The utility in installing ¾-inch and 1-inch services may use the following formula as a guide provided the requirements of paragraph II 3 a are met:

¾-Inch Service

Residential Lot Area—Metered Service—8,000 square feet

Flat Rate Service—10,000 square feet

Business—Not over 10 outlets and only one flush-o-meter toilet.

1-Inch Service

Residential Lot Area—Metered Service—8,000 to 20,000 square feet

Flat Rate Service—10,000 to 25,000 square feet

Business—From 10 to 30 outlets and from 1 to 2 flush-o-meter toilets.

- b. Depth of Service Pipe. Except in unusual conditions all service pipes shall be laid at a depth sufficient to prevent freezing, except where services are not intended for use during freezing weather and are actually drained prior to such weather, and at a depth of not less than 18 inches except at its termination in connecting with the meter or customer's piping.

V. EXTENSION OF SERVICE

1. Mains. Each utility shall file with this Commission as a part of each of its regularly filed tariff schedules the main extension rule prescribed by this Commission.
2. Service Connections.
 - a. Ownership of Service.
 - (1) Charge for Service Connections. Except as noted in 2(a) (1) (A) or 2(a) (1) (B) below, the utility shall make no charge to a customer for making a service connection except in case of connections for private fire protection service, connections for temporary service, changes made at the request and for the convenience of the customer, where additional connections are requested, because of divisions of land ownership when the land before division was receiving service, and as otherwise provided in the utility's main extension rules.
 - (A) Individual Customer Connection Fee. A Class C or Class D utility, or a Class A or Class B utility district or subsidiary serving 2,000 or fewer connections, may accept from individual customers amounts in contribution as a connection fee calculated pursuant to the Commission's Connection Fee Data Form contained in the utility's tariffs.

(B) Individual Customer Facilities Fee. A Class C or Class D utility, or a Class A or Class B utility district or subsidiary serving 2,000 or fewer connections, may accept from individual customers amounts in contribution as a facilities fee calculated pursuant to tariffs approved by the Commission.

- (2) Utility's Responsibility. In urban areas with dedicated front streets, rear service roads, or public utility easements the utility shall furnish and install the service pipe, curb stop, meter and meter box at its own expense for the purpose of connecting its distribution system to the customer's piping, except as provided in Section V.2.(a)(1)(A). The service connection, curb stop, meter and meter box may be installed at a convenient place between the property line and the curb, or inside the customer's property line where necessary. The service connection shall determine the point of delivery to the customer of water service by the utility. No rent or other charge will be paid by the utility where such utility owned service facilities are located on a customer's premises. In areas which do not have dedicated front streets, rear service roads, or public utility easements the utility shall furnish and install the service pipe, curb stop, meter and meter box at a convenient point on or near the customer's property except for service beyond the service area. As a condition of providing a new water service connection the utility shall require that a meter shall be installed. The utility may impose and collect the cost of meter and meter installation charges as contribution, including income tax gross-up required by a contribution, through a separate charge for meter installation. Such charge shall be limited to cost of meter and installation of meter for a new water service connection made on and after January 1, 1992, or as provided in Section V.2.(a)(1)(A).
- (3) Customer's Responsibilities Precedent to Receiving Service. The customer as a condition precedent to receiving service shall furnish and lay the necessary piping to make the connection from the service connection to the place of consumption and shall keep such piping in good repair in accordance with such reasonable requirements of the utility as may be incorporated in its rules. A main valve shall also be provided by the customer on his piping between the service connection and the point of use. Where service is rendered at or near the service area boundary for use beyond the service area the customer will be required to install, operate and maintain the facilities necessary to provide service.

- b. Location of Service. The customer's piping shall extend to that point on the curb line or property line easiest of access to the utility from its existing distribution system or requiring the least extension of the existing distribution main. The utility should be consulted before installation thereof and its approval of location secured.

VI. MEASUREMENT OF SERVICE

- 1. Method of Measuring Service.
 - a. Metering. All water sold by a utility shall be upon the basis of metered volume sales except that the utility may at its option provide flat rate or estimated service for the following:
 - (1) Residential, business, commercial, industrial (in special situations) and irrigation service after authorization has first been obtained from the Commission.
 - (2) Temporary service where the water use can be readily estimated.
 - (3) Public and private fire protection service.
 - (4) Water used for street sprinkling and sewer flushing, when provided for by contract between the utility and the municipality or other local governmental authority.
 - b. Registration of Meter. All meters used for metered sales excluding sales from irrigation systems or other irrigation sales shall have registration devices indicating the volume of water in either cubic feet or United States gallons. Where a constant or multiplier is necessary to convert the meter reading to cubic feet or gallons, the constant shall be indicated on the meter or on the meter reading sheet.
 - c. Irrigation Meters. Irrigation service may be provided with meters which measure in acre feet or miner's inch days. This service may also be rendered on a volume basis by the use of a calibrated orifice such as the miner's inch box, by the use of weirs or otherwise measured as provided in applicable tariff schedules.
 - d. Charge for Meter Installation. No utility shall charge for its installation of any devices for metering service to a customer, except if irrigation service is rendered through more than one outlet for the convenience of the customer, or if, on and after January 1, 1992 a new water service connection is made, a utility may charge all new customers the cost of meter and meter installation as separate meter installation charges limiting such charges to cost of meter and cost of installing the meter, or as provided in Section V.2.(a)(1)(A).
 - e. Meter Reading. All utilities that provide water service to customers that have a metered service connection shall read each customer's meter and report in the annual report submit-

ted to the California Public Utilities Commission water quantities used, by classification of service, in each service territory or separate district.

2. Meter Test Facilities and Equipment.

- a. Test Facilities. Each utility furnishing metered water service shall provide the necessary standard facilities, instruments and other equipment for testing its meters in compliance with these rules. Any utility may be excepted from this requirement provided that satisfactory arrangements are made for test of its meters by another utility or agency equipped to test meters in compliance with these rules.
- b. Shop Equipment. The meter test shop shall be provided with the necessary equipment to test up through 2-inch displacement meters, including a quick acting valve for controlling the starting and stopping of the test and a device for regulating the flow of water through the meter under test. The accuracy of the test equipment and test procedures shall be sufficient to enable shop test of displacement meters with an error not to exceed 0.3 of 1%.
- c. Test Measurement Standards. Measuring devices for test of meters shall consist of calibrated tanks for volumetric measurement, tanks mounted upon scales for weight measurement or standard meters.
 - (1) Basic Standards. When a volumetric tank is used, it shall be accompanied by a certificate of accuracy acceptable to the Commission from a County Sealer of Weights and Measures or from a standards laboratory. When a weight standard is used, the scales shall be tested and calibrated at least once every year by such approved laboratory, or County Sealer of Weights and Measures and a record maintained of the results of the test. Standard meters may be used for field tests of meter accuracy provided they are tested and calibrated to permit the test of meters within the limits of accuracy required by these rules, either by the utility with its volumetric or weight standard equipment or by an approved laboratory at least once every 60 days while the standard meter is in use and a record of such tests shall be kept by the utility for a period of not less than five years.
 - (2) Size of Basic Standards. When basic standards are used for meter tests, they shall be of a capacity sufficient to insure accurate determinations. The minimum requirement for testing disc meters from $\frac{5}{8} \times \frac{3}{4}$ -inch through 2 inches in size shall include a 10 and a 1 cubic-foot tank for meters registering in cubic feet or a 100 and a 10-gallon tank for meters registering in gallons.

3. Accuracy Requirements of Water Meters.

- a. General. All meters used for measuring quantities of water delivered to customers shall be in good mechanical condition, shall be adequate in size and design for the type of service which each measures and shall be accurate to within generally accepted standards. The standards of accuracy for displacement meters are set forth in paragraphs b and c, following.
- b. Test Flows. For determination of minimum test flow and normal test flow limits, the Commission adopts as a guide the appropriate standard specifications of the American Water Works Association for the various types of meters. These test flows for displacement type cold water meters are as follows:

<i>Nominal Meter Size Inches</i>	<i>Minimum Test Flow Gallons per Minute</i>	<i>Normal Test Flow Limits Gallons per Minute</i>
$\frac{3}{8}$ or $\frac{1}{2} \times \frac{3}{4}$	$\frac{1}{4}$	1-20
$\frac{3}{4}$	$\frac{1}{2}$	2-30
1.....	$\frac{3}{4}$	3-50
1- $\frac{1}{2}$	1- $\frac{1}{2}$	5-100
2.....	2	8-160
3.....	4	16-300
4.....	7	28-500
6.....	12	48-1000

- c. Determination of Accuracy. Displacement meters shall be tested at three or more test flows: one at the minimum test flow, one at 10% of the maximum normal test flow limit and one at a rate over 35% of the maximum normal test flow limit. A meter shall not be placed in service if it registers less than 95% of the water passed through it at the minimum test flow or over or under registers more than 1½% in the normal test flow limits; with the exception that a repaired meter shall register not less than the following appropriate percentage of the water passed through it at the minimum test flow and shall not over or under register more than 2% in the normal test flow limits,

If manufactured on or after January 1, 1947	90%
If manufactured prior to January 1, 1947	85%
- d. Sealing of Meter. Upon completion of adjustment and test of any water meter under the provisions of these rules, the utility shall affix thereto a suitable seal in such a manner that adjustment or registration of the meter cannot be tampered with without breaking the seal.
- e. Record of Test. A complete record of all displacement and other mechanical meter tests and data sufficient to allow checking of test calculations, shall be recorded by the meter tester. Such record shall include: the identifying number of the meter; the type and size of the meter; the constant of the meter; the date and kind of tests made; the reading of the meter before making any test; the error as found at each test;

and, if readjusted, the percentage of registration as left after each test. The complete record of tests of each meter shall be retained for at least five years.

4. Initial Tests and Storage of Meters. Every water meter shall be tested as required by these rules prior to its installation either by the manufacturer, the utility or any reliable organization equipped for meter testing. Each meter should be stored in an inverted position or utilize a type of intermediate gear train lubricant which will not flow into the measuring chamber during storage, and unless so stored or lubricated it shall be so tested immediately before installation.
5. Repaired or Tested Meters. All water meters removed from service for repair or tested in accordance with these rules shall be restored to the prescribed limits of accuracy as required by these rules before again being placed in service.
6. Periodic Tests of Water Meters.

- a. General. The length of time that a meter shall be allowed to remain in service before being tested, or overhauled and tested, should be determined from an economic analysis.

- b. Test Periods.

- (1) Adoption of Test Periods by Utility. A utility may adopt a test period for the periodic test of meters within any well defined separate system as the utility may deem appropriate, based upon a consideration of relevant economic factors and accuracy of meters, provided authorization for such test period for any such separate system is first obtained from the Commission. Requests for such authorization may be made by an application and showing of necessity by letter.

- (2) Test Periods if Not Adopted by Utility. Unless a test period for such periodic tests of meters shall have been adopted as provided in paragraph (1), above, no meter shall be allowed to remain in service without retesting for more than the number of years indicated in the following tabulation:

<i>Size of Meter</i>	<i>Maximum Period</i>
Smaller than 1-inch	20 years
1-inch	15 years
Larger than 1-inch	10 years

Nothing in these rules shall be construed to mean that such periodic tests may not be made more frequently than the maximum period specified herein.

- c. Report of Periodic Tests of Meters. Each utility shall make a summary of all periodic tests of meters made each calendar year as required by these rules and shall submit such summary concurrently with, or as part of, the utility's Annual Report to the Commission for that year.

7. Tests on Customer Request.

- a. Compliance by Utility. The utility shall within one week after request by a customer proceed to test the meter serving his premises, except where service is rendered from open conduits such test may be deferred for a reasonable length of time when it would necessitate the interruption of service to any other customer. Such test of meters other than displacement meters shall consist of an acceptable method of verifying the accuracy of the meter.
- b. Charge for Test. No charge shall be made for such a test, except where a customer requests a test within six months after installation of the meter or more often than once a year, in which cases the customer shall be required to deposit with the utility the following amount to cover the cost of each such test:

<i>Size of Meter</i>	<i>Amount of Deposit</i>
One inch or smaller.....	\$2.00
Larger than one inch	3.50

- c. Test Procedure. Every meter tested at the request of a customer shall be tested in the condition as found in the customer's service prior to any alteration or adjustment in order to determine the average meter error. This test shall consist of testing at the three rates of flow as determined in paragraph 3c, above, and in addition, at twice the minimum test flow. The average meter error shall be considered to be the algebraic average of the errors of the three highest test flows.
 - d. Return of Deposit. Any deposit made under paragraph b, above, will be returned to the customer if the average meter error is found to be more than 2% fast. The customer will be notified not less than five days in advance of the time and place of the test.
 - e. Location of Test. A customer shall have the right to require the utility to conduct the test in his presence or in the presence of his representative. Where the utility has no proper meter testing facilities available locally, the meter may be tested by a meter manufacturer or its agency, or by any other reliable organization equipped for water meter testing or by the utility's meter testing plant where located in some other community, in which latter case the utility upon demand of the customer shall furnish the customer with a notarized statement certifying as to the method used in making the test and as to the accuracy of the meter.
 - f. Report of Test to Customer. A report showing the results of the test shall be furnished to the customer within 15 days after the completion of the test.
8. Meter Records. Each utility shall keep records giving for each displacement and other mechanical meter owned and used by it

for any purpose the identification number, name of manufacturer, serial number, type, size and the dates of installation and removal. These records shall also give condensed information, including dates, concerning all tests.

VII. RATES AND BILLING

1. Filing of Tariffs. Each utility shall file with the Commission its tariff schedules containing all tariff sheets in accordance with the procedure prescribed by the Commission.
2. Information on Bills. Each utility shall render a bill to each customer for each billing period. Bills for metered service shall show at least the reading of the meter at the end of the period for which the bill is rendered, the meter constant, if any, the number and kinds of units, and date of the current meter reading.
3. Adjustment of Bills for Meter Error.
 - a. Fast Meters. When, upon test, a meter is found to be registering more than 2% fast, the utility shall refund to the customer the amount of the overcharge based on corrected meter readings for the period the meter was in use but not to exceed a period of six months.
 - b. Slow Meters.
 - (1) Commercial Service. When, upon test, a meter used for commercial (residential and business) service is found to be registering more than 25% slow, the utility may bill the customer for the amount of the undercharge based upon corrected meter readings for the period the meter was in service but not to exceed a period of three months.
 - (2) Other Than Commercial Service. When, upon test, a meter used for other than commercial service, is found to be registering more than 5% slow, the utility may bill the customer for the amount of the undercharge based upon corrected meter readings for the period the meter was in service but not to exceed a period of three months.
 - c. Nonregistering Meters. The utility may bill the customer for water consumed while the meter was nonregistering, but not to exceed a period of three months, at the minimum monthly meter rate, or upon an estimate of the consumption based upon the customer's prior use during the same season of the year if conditions were unchanged, or upon an estimate based upon a reasonable comparison with the use of other customers during the same period receiving the same class of service under similar circumstances and conditions.

- d. General. When it is found that the error in a meter is due to some cause, the date of which can be fixed, the overcharge or the undercharge shall be computed back to but not beyond such date.

VIII. FIRE PROTECTION STANDARDS

1. Design Requirements. The flow standards for public fire protection purposes set forth below are those the Commission considers appropriate for application on an average statewide basis. However, the Commission recognizes that there are widely varying conditions bearing on fire protection throughout the urban, suburban, and rural areas of California. Therefore, the standards prescribed by the local fire protection agency or other prevailing local governmental agency will govern. Such local flow standards shall be provided whether greater or lesser than those set forth below, except that mains designed for and capable of providing flows in excess of the requirements set forth in the following table opposite the classification of land use shall be considered mains providing excess flow for the purpose of the application of the utility's main extension rule.
 - (a) Initial Construction, Extension, or Modification. In the initial construction, extension, or modification of a water system, any one of which is required to serve (a) a new applicant or (b) a change in use, the facilities constructed, extended, or modified shall be designed to be capable of providing, for a sustained period of at least two hours, in addition to the requirements of the average daily demand within the area to be served, the minimum flow requirements set forth below opposite the classification of land use to be served, or such other fire flow, either higher or lower, as determined either necessary or adequate by appropriate local governmental agency.

<i>Land Use</i>	<i>Minimum Flow</i>
1. Rural, residential with a lot density of two or less per acre primarily for recreational and/or parttime occupancy	250gpm
2. Lot density of less than one single-family residential unit per acre	500gpm
3. Lot density of one or two single-family residential units per acre	750gpm
4. Lot density of three or more single-family residential units per acre, including mobile home parks	1,000gpm
5. Duplex residential units, neighborhood business of one story	1,500gpm
6. Multiple residential, one and two stories; light commercial or light industrial	2,000gpm
7. Multiple residential, three stories or higher; heavy commercial or heavy industrial	2,500gpm

Except as provided in Section VIII 1. (b) below, cost of facilities to meet the governing fire flow standards shall be advanced or contributed in accordance with the utility's tariffs by the party requesting such facilities, unless assumed by the fire protection agency under a signed written agreement.

An existing main which is adequate to provide residential, commercial, or industrial service, but is not sized for the required fire flow, need not be modified for an additional service connection of the same land use classification when no main extension is involved, unless local authority determines that there is increased exposure of life and property to fire hazards.

Modification of a main to meet requirements set forth under "Land Use" is required for a new land use requiring higher fire flow. No modification is required when existing apartments, receiving service, are converted to condominiums without change of use unless higher fire flows are required by a government agency.

(b) Replacement of Mains. The utility shall not be responsible for modifying or replacing at its expense an existing main, which is otherwise adequate, to provide increased fire flow. However, when the utility initiates the replacement of an existing main, the replacement main, if used or useful for fire protection purposes, shall be constructed at the expense of the utility and be sized to accommodate the governing fire flow standard.

2. Flow Tests. The flows set forth in paragraph 1 above are to be calculated on the basis of a residual pressure of 20 p.s.i.g. in the distribution system under flowing conditions.
3. Fire Hydrants. Fire hydrants shall be attached to the distribution system at the locations designated by the agency responsible

for their use for fire fighting purposes. Any new mains to which a hydrant may be attached shall be not less than six inches in diameter.

4. Fire Hydrant Service Agreement. The Commission encourages all water utilities to provide fire hydrant service by agreement between the utility and the fire protection agency responsible for the use of the hydrants. Each water utility is expected to make all reasonable efforts to make or renew agreements advantageous to the utility and its customers.

When such written agreement is entered into between the utility and the fire protection agency which requires the utility to be responsible for all or any portion of the capital expenditures or maintenance costs associated with providing fire hydrant service, such expenditures and costs may be included by the utility in its general plant accounts and operating expenses for ratemaking purposes. The utility may bill the fire protection agency for fire hydrant service charges only under written agreement with the agency that it will pay such charges. Fire hydrant charges made under written agreement will also be included in revenues for ratemaking purposes.

In the absence of any written agreement between the utility and the fire protection agency, the utility will be responsible for maintaining fire hydrant service to the extent of its means. All costs associated with providing this service may be included for ratemaking purposes.

Fire hydrant service agreements between the fire protection agency and the utility which deviate materially from a standard fire hydrant service agreement on file in the utility's tariffs shall be submitted by advice letter in accordance with General Order 96-A.

5. Source of Supply. Each separately operated water system shall have not less than two independent sources of supply.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

By NEAL SHULMAN
Executive Director

APPENDIX A

Sections of Rules Governing Water Service Including Minimum Standards for Design and Construction which shall be applicable to utility water systems supplying water not intended or claimed to be potable from ditches, canals, or other conduits.

Section I—General

All paragraphs of the section, except (2), (3), and (4) of paragraph 10a.

Section II—Standards of Service

Paragraphs 2 and 4 of this section, except that paragraph 2c shall not apply to scheduled interruptions as provided in applicable tariffs.

Section III—Standards of Design

None.

Section IV—Standards of Construction

None.

Section V—Extension of Service

Paragraph 2a (1) of this section.

Section VI—Measurement of Service

All paragraphs of the section, except when sales are measured by other than displacement meters as provided in applicable tariff schedules only paragraphs 1, 3a and e, 5, 6a, 7a, e and f and 8 shall apply.

Section VII—Rates and Billing

All paragraphs of the section, except when sales are measured by other than displacement meters as provided in applicable tariff schedules only paragraphs 1, 2 and 3c and d shall apply.

Section VIII—Fire Protection Standards

None.

APPENDIX B

Specification for the Coating and Wrapping of Steel Water Pipe

1. Scope.

These specifications cover the material for the asphalt coating of steel water pipe by the double dip process and the wrapping of same with asbestos felt or fiberglass.

2. Materials.

Asphalt: Asphalt shall be Union Oil Company's "190 Pipe Dip", or an approved equivalent, and shall conform to the physical requirements set forth below. (Penetration and softening points shall meet the ASTM standard methods of test as specified under the specification Designations ASTM-D5-52 and ASTM-D36-26, respectively.)

Penetration at 115° F	0.75 cm max.
Penetration at 77° F	Not less than 0.27 cm
Penetration at 32° F	Not less than 0.20 cm
Softening point	Not less than 190° F
Flash point	Not less than 425° F
Ductility at 77° F	Not less than 2.0 cm
Solubility in CCl ₄	Not less than 99.0%
Loss on heating (% by weight)	0.75 max.
Penetration after loss on heating	80% min.

3. Wrapping, Asbestos Felt or Fiberglass.

After completion of asphalt coating of pipe it shall be machine wrapped with asbestos felt or fiberglass. The wrapping shall be completely sealed and bonded onto the dipped pipe by use of a hot asphaltic coating composition. This asphalt seal coat shall also be applied between the overlaps of the wrapping. Special sections, such as tapers, elbows, and other fittings, may be wrapped by hand. The wrapping shall be applied in a special manner providing a minimum overlap of ½-inch. It shall be ap-

plied smoothly under suitable mechanical tension to give a good tight wrapping free from wrinkles, buckles, air pockets and tears. At each end of each section of pipe the wrapping shall be omitted for a sufficient distance to permit making the field joints. The minimum distance shall be such as to expose at least 1-inch of asphalt.

4. *Cleaning of Pipe.*

All metal surfaces to be coated shall be thoroughly cleaned of all loose mill scale, dirt, oil, grease, rust and other foreign matter.

5. *Transporting and Handling Coated Pipe.*

The coated pipe shall at all times be handled in such manner, and with such equipment, as will prevent any damage to the protective coating. In loading pipe for shipment, adequate blocking, cradles, braces and padding shall be used as necessary to properly support and secure the pipe and to prevent any abrasion or other damage to the coating in transit.

CHART I

**WATER SUPPLY REQUIREMENTS CHART
FOR FLAT RATE AND METERED
WATER SYSTEMS**

THIS CHART IS FOR AVERAGE REQUIREMENTS OF SERVICE.
FOR OTHER THAN AVERAGE REQUIREMENTS THE RESULTS
SHALL BE SUPPLEMENTED AS APPROPRIATE.

FLAT RATE

METERED

LEGEND

Q = FLOW REQUIREMENT IN G.P.M.
N = NUMBER OF CUSTOMERS SERVED
C = A GALLON PER MINUTE CONSTANT:
FOR FLAT RATE SYSTEMS 5 TO 9
FOR METERED SYSTEMS 2 TO 3
F = A FACTOR TO REFLECT DIVERSITY

EXAMPLE A 1700 CUSTOMERS - FLAT RATE

* { MAX. REQUIREMENTS 4500 G.P.M.
{ MIN. REQUIREMENTS 2600 G.P.M.

EXAMPLE B 500 CUSTOMERS - METERED RATE

* { MAX. REQUIREMENTS 1400 G.P.M.
{ MIN. REQUIREMENTS 540 G.P.M.

* POSITION IN RANKS DETERMINED BY PAST EXPERIENCE AND/OR BY OTHER FACTORS
SUCH AS AREA, EXPERIENCE, COMMUNITY STANDARD OF LIVING, CLIMATE, CLASS
OF CONSUMERS, QUALITY AND COST OF WATER AND SEWER FACILITIES.

AXES:

- Top Axis (Left): GALLONS PER MINUTE (10 to 10,000)
- Top Axis (Right): GALLONS PER MINUTE (100 to 1,000)
- Bottom Axis (Left): GALLONS PER MINUTE (10 to 10,000)
- Bottom Axis (Right): GALLONS PER MINUTE (100 to 1,000)
- Middle Axis (Left): CUSTOMERS (1 to 100)
- Middle Axis (Right): CUSTOMERS (1 to 100)
- Inner Middle Axis (Right): F FACTOR (0.3 to 1.0)

Curves:

- Flat Rate: $Q = NCF, C = 5$
- Metered: $Q = NCF, C = 2$

